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INCLUDING EXPERIMENTAL PEDAGOGY, CHILD PHYSIOLOGY AND HYGIENE, AND EDUCATIONAL STATISTICS

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EDITORIAL

Not many years ago, Professor Royce argued with force and insight the need of a "middleman" whose task should be to mediate between the science of psychology and the art of teaching—a man of careful laboratory training and with an abiding interest in the problems of the schoolroom. The editors of this Journal believe that there is equal need of a "middle-magazine"—of a journal that shall afford a common meeting ground for the psychologist and the educator. We seek to supply the worker in the laboratory with a channel for the promulgation of those results of his investigation of mental life that bear, directly or indirectly, upon the problems of teaching, and we seek to enlist and stimulate the interest of schoolmen in the discussion of the varied and highly important problems of education that have psychological bearing. We regard, then, this Journal as a clearing-house for the exchange of information upon all that concerns the relation of psychology to education.

To accomplish this purpose, we propose to print in each issue a number of original contributions, to provide adequate space for discussions and communications upon matters of interest, to report as promptly as possible the news items which concern the workers in our field, and, finally, to make a special feature of accurate and useful reviews or digests that will serve to condense and coördinate the growing literature of educational psychology. We feel that such reviews will economize the time of those who are directly concerned in psychology, as well as of those many schoolmen who are ready and anxious to advance the cause of education, but who have neither the time nor the energy themselves to follow in technical journals the results of research and investigation.

The term "Educational Psychology" will, for our purposes, be interpreted in a broad sense as covering all those phases of the study of mental life which concern education. Educational psychology will then be regarded as including not only the well-known field covered by the

average text-book—the psychology of sensation, instinct, attention, habit, memory, the technique and economy of learning, the conceptual processes, etc.—but also problems of mental development—heredity, adolescence and the inexhaustible field of child-study—the study of individual differences, of retarded and precocious development, the psychology of the "special class," the nature of mental endowments, the measurement of mental capacity, the psychology of mental tests, the correlation of mental abilities, the psychology of special methods in the several school branches, the important problems of mental hygiene; all these, whether treated from the experimental, the statistical or the literary point of view, are topics and problems which we deem pertinent for consideration in a Journal of Educational Psychology.

As a particular feature, we desire to perform for this country a service such as Meumann's *Zeitschrift für Experimentelle Pädagogik* is performing for Germany; that is, to stimulate interest in, and further the progress of experimental pedagogy, for we believe that the time is ripe for the study of schoolroom problems in the schoolroom itself and by the use of the experimental method. Educational practice is still very largely based upon opinion and hypothesis, and thus will it continue until competent workers in large number are enlisted in the application of the experimental method to educational problems. Little more than a beginning has been made in this important movement. We may well quote the observation of Fechner, when he contemplated the possibilities of the new science of psychophysics: "Here indeed, is there still open, especially to the energies of younger folk, a rich field for future investigation,—investigation which is not in itself difficult, but which demands attention, patience, perseverance, and honesty."[1]

It has been remarked that "the whole educational trade does its business today with small coin," and many would like to add that too often even that coin fails to "ring true." We propose in this Journal to refrain from the iteration of the trite aphorisms of educa-

[1] "Vielmehr bietet sich in dieser Hinsicht noch ein reiches Feld künftiger Untersuchung, namentlich für jüngere Kräfte . . . . dar, einer Untersuchung die an sich nicht schwierig ist, aber Geduld, Aufmerksamkeit, Ausdauer, und Treue erfordert"

tional thought. We propose to maintain a high standard of scientific worth and reliability, to print what is worth printing, and to attack, as skilfully as we may, the problems that press for solution in our field. Only in such a way, we believe, can education conserve the dignity of a profession and win an unchallenged place in the ranks of science.

Finally, it should be said that this magazine is not the organ of any man or institution, or of any group of men or institutions; nor is it the champion of any special movement. Our columns are, within the limitations of space, open for the helpful presentation and discussion of the problems that have been outlined, and we welcome the coöperation of all who are interested in the furtherance of our aims.

THE CONTRIBUTION OF PSYCHOLOGY TO EDUCATION

EDWARD L. THORNDIKE

Teachers Col'ege, Columbia University

Psychology is the science of the intellects, characters and behavior of animals including man. Human education is concerned with certain changes in the intellects, characters and behavior of men, its problems being roughly included under these four topics: Aims, materials, means and methods.

Psychology contributes to a better understanding of the aims of education by defining them, making them clearer; by limiting them, showing us what can be done and what can not; and by suggesting new features that should be made parts of them.

Psychology makes ideas of educational aims clearer. When one says that the aim of education is culture, or discipline, or efficiency, or happiness, or utility, or knowledge, or skill, or the perfection of all one's powers, or development, one's statements, and probably one's thoughts, need definition. Different people, even amongst the clearest-headed of them, do not agree concerning just what culture is, or just what is useful. Psychology helps here by requiring us to put our notions of the aims of education into terms of the exact changes that education is to make, and by describing for us the changes which do actually occur in human beings.

Psychology helps to measure the probability that an aim is attainable. For example, certain writers about education state or imply that the knowledge and skill and habits of behavior which are taught to the children of today are of service not only to this generation and to later generations through the work this generation does, but also to later generations forever through the inheritance of increased capacity for knowledge and skill and morals. But if the mental and moral changes made in one generation are not transmitted by heredity to the next generation, the improvement of the race by direct transfer of acquisitions is a foolish, because futile aim.

Psychology enlarges and refines the aim of education. Certain features of human nature may be and have been thought to be unimportant or even quite valueless because of ignorance of psychology. Thus for hundreds of years in the history of certain races even the most gifted thinkers of the race have considered it beneath the dignity of education to make physical health an important aim. Bodily welfare was even thought of as a barrier to spiritual growth, an undesirable interferer with its proper master. Education aimed to teach it its proper place, to treat it as a stupid and brutish slave. It is partly because psychology has shown the world that the mind is the servant and co-worker as well as the master of the body, that the welfare of our minds and morals is intimately bound up with the welfare of our bodies, particularly of our central nervous systems, that today we can all see the eminence of bodily health as an aim of education.

To an understanding of the material of education, psychology is the chief contributor.

Psychology shares with anatomy, physiology, sociology, anthropology, history and the other sciences that concern changes in man's bodily or mental nature the work of providing thinkers and workers in the field of education with knowledge of the material with which they work. Just as the science and art of agriculture depend upon chemistry and botany, so the art of education depends upon physiology and psychology.

A complete science of psychology would tell every fact about every one's intellect and character and behavior, would tell the cause of every change in human nature, would tell the result which every educational force—every act of every person that changed any other or the agent himself—would have. It would aid us to use human beings for the world's welfare with the same surety of the result that we now have when we use falling bodies or chemical elements. In proportion as we get such a science we shall become masters of our own souls as we now are masters of heat and light. Progress toward such a science is being made.

Psychology contributes to understanding of the means of education, first, because the intellects and characters of any one's parents, teachers and friends are very important means of educating him, and, second,

because the influence of any other means, such as books, maps or apparatus, cannot be usefully studied apart from the human nature which they are to act upon.

Psychology contributes to knowledge of methods of teaching in three ways. First, methods may be deduced outright from the laws of human nature. For instance, we may infer from psychology that the difficulty pupils have in learning to divide by a fraction is due in large measure to the habit established by all the thousands of previous divisions which they have done or seen, the habit, that is, of "division—decrease" or "number divided—result smaller than the number." We may then devise or select such a method as will reduce this interference from the old habits to a minimum without weakening the old habits in their proper functioning.

Second, methods may be chosen from actual working experience, regardless of psychology, as a starting point. Thus it is believed that in the elementary school a class of fifteen pupils for one teacher gives better results than either a class of three or a class of thirty. Thus, also, it is believed that family life is better than institutional life in its effects upon character and enterprise. Thus, also, it is believed that in learning a foreign language the reading of simple discussions of simple topics is better than the translation of difficult literary masterpieces that treat subtle and complex topics. Even in such cases psychology may help by explaining *why* one method does succeed better and so leading the way to new insights regarding other questions not yet settled by experience.

Third, in all cases psychology, by its methods of measuring knowledge and skill, may suggest means to test and verify or refute the claims of any method. For instance, there has been a failure on the part of teachers to decide from their classroom experience whether it is better to teach the spelling of a pair of homonyms together or apart in time. But all that is required to decide the question for any given pair is for enough teachers to use both methods with enough different classes, keeping everything else except the method constant, and to measure the errors in spelling the words thereafter in the two cases. Psychology, which teaches us how to measure changes in human nature, teaches us how to decide just what the results of any method of teaching are.

So far I have outlined the contribution of psychology to education from the point of view of the latter's problems. I shall now outline very briefly the work being done by psychologists which is of special significance to the theory and practice of education and which may be expected to result in the largest and most frequent contributions.

It will, of course, be understood that directly or indirectly, soon or late, every advance in the sciences of human nature will contribute to our success in controlling human nature and changing it to the advantage of the common weal. If certain lines of work by psychologists are selected for mention here, it is only because they are the more obvious, more direct and, so far as can now be seen, greater aids to correct thinking about education.

The first line of work concerns the discovery and improvement of means of measurement of intellectual functions. (The study of means of measuring moral functions such as prudence, readiness to sacrifice an immediate for a later good, sympathy, and the like, has only barely begun.) Beginning with easy cases such as the discrimination of sensory differences, psychology has progressed to measuring memory and accuracy of movement, fatigue, improvement with practice, power of observing small details, the quantity, rapidity and usefulness of associations, and even to measuring so complex a function as general intelligence and so subtle a one as suggestibility.

The task of students of physical science in discovering the thermometer, galvanometer and spectroscope, and in defining the volt, calorie erg, and ampère, is being attempted by psychologists in the sphere of human nature and behavior. How important such work is to education should be obvious. At least three-fourths of the problems of educational practice are problems whose solution depends upon the *amount* of some change in boys and girls. Of two methods, which gives the *greater* skill? Is the gain in general ability from a "disciplinary" study so great as to outweigh the loss in specially useful habits? Just how much more does a boy learn when thirty dollars a year is spent for his teaching than when only twenty dollars is spent? Units in which to measure the changes wrought by education are essential to an adequate science of education. And, though the students of education may establish these units by their own investigations, they can use and will need all the experience of psychologists in the search for similar units.

The second line of work concerns race, sex, age and individual differences in all the many elements of intellect and character and behavior.

How do the Igorottes, Ainus, Japanese and Esquimaux differ in their efficiency in learning to operate certain mechanical contrivances? Is the male sex more variable than the female in mental functions? What happens to keenness of sensory discrimination with age? How do individuals of the same race, sex and age differ in efficiency in perceiving small visual details or in accuracy in equaling a given length, or in the rapidity of movement? These are samples of many questions which psychologists have tried to answer by appropriate measurements. Such knowledge of the differences which exist amongst men for whatever reason is of service to the thinker about the particular differences which education aims to produce between a man and his former self.

These studies of individual differences or variability are being supplemented by studies of correlations. How far does superior vividness and fidelity in imagery from one sense go with inferiority in other sorts of imagery? To what extent is motor ability a symptom of intellectual ability? Does the quick learner soon forget? What are the mental types that result from the individual variations in mental functions and their inter-correlations? Psychology has already determined with more or less surety the answers to a number of such questions instructive in their bearing upon both scientific insight into human nature and practical arrangements for controlling it.

The extent to which the intellectual and moral differences found in human beings are consequences of their original nature and determined by the ancestry from which they spring, is a matter of fundamental importance for education. So also is the manner in which ancestral influence operates. Whether such qualities as leadership, the artistic temperament, originality, persistence, mathematical ability, or motor skill are represented in the germs each by one or a few unit characters so that they "Mendelize" in inheritance, or whether they are represented each by the coöperation of so many unit characters that the laws of their inheritance are those of "blending" is a question whose answer will decide in great measure the means to be employed for racial improvement. Obviously both the amount and

the mode of operation of ancestral influence upon intellect and character are questions which psychology should and does investigate.

The results and methods of action of the many forces which operate in childhood and throughout life to change a man's original nature are subjects for study equally appropriate to the work of a psychologist, a sociologist or a student of education, but the last two will naturally avail themselves of all that the first achieves. Although as yet the studies of such problems are crude, speculative and often misguided, we may hope that the influence of climate, food, city life, the specialization of industry, the various forms of the family and of the state, the different "studies" of the schools, and the like will come to be studied by as careful psychologists and with as much care as is now the case with color-vision or the perception of distance.

The foundation upon which education builds is the equipment of instincts and capacity given by nature apart from training. Just as knowledge of the peculiar inheritance characteristic of any individual is necessary to efficient treatment of him, so knowledge of the unlearned tendencies of man as a species is necessary to efficient planning for education in general. Partly in conscious response to this demand and partly as a result of growing interest in comparative and genetic psychology, there have been in the last two decades many studies by psychologists of both the general laws of instinct and their particular natures, dates of appearance and disappearance, and conditions of modifiability. The instincts of attitude—of interest and aversion—are of course to be included here, as well as the tendencies to more obviously effective responses.

It is unfortunately true that the unlearned tendencies to respond of ants and chickens have been studied with more care than those of men, and also that the extreme complexity and intimate mixture with habits in the case of human instincts prevent studies of them, even when made with great care, from giving entirely unambiguous and elegant results. But the educational theorist or practitioner who should conclude that his casual observations of children in homes and schools needs no reinforcement from the researches of psychologists would be making the same sort of, thought not so great, an error as the pathologist or physician who should neglect the scientific studies of bacteria and protozoa. Also the psychologist who condemns these

studies *in toto* because they lack the precision and surety of his own studies of sensations and perceptual judgments is equally narrow, though from a better motive.

The modifications of instincts and capacities into habits and powers and the development of the latter are the subjects of researches in dynamic psychology which are replacing the vague verbal and trite maxims of what used to be called "applied psychology" by definite insights into reality far in advance of those which common-sense sagacity alone can make. We are finding out when and why "practice makes perfect" and when and why it does not; wherein the reinforcement of a connection between situation and response by resulting satisfaction is better than the inhibition of alternative connections by discomfort and wherein it is not; what the law of diminishing returns from equal amounts of practice is, what it implies, and how it is itself limited; how far the feelings of achievement, of failure and of fatigue are symptomatic of progress, retardation and unfitness for work. Such a list of topics could be much extended even now and is being increased rapidly as more psychologists and more gifted psychologists come to share in the study of the learning process.

Only twenty years ago a student could do little more than add to his own common-sense deductions from the common facts of life the ordered series of similar deductions by the sagacious Bain. Bain utilized all the psychology of his day as well as the common fund of school-room experience, but today his book is hopelessly outgrown. Although it was the source of the minor books on the topic during the eighties and nineties, no one would now think of presenting the facts of the science of education by a revised edition of Bain.

Other lines of psychological work deserve more than mention. Incidental contributions from studies of sensory and perceptual processes, imagery and memory, attention and distraction, facilitation, inhibition and fatigue, imitation and suggestion, the rate and accuracy of movement and other topics—even from studies made with little or no concern about the practical control of human nature—sum up to a body of facts which do extend and economize that control. The special psychology of babies, children and adolescents is obviously important to education. False infant psychology or false child psychology is harmful, not because it is infant psychology, but because it is false.

I give only mention to these so as to save space in which to call attention to another relation between psychology and education which is not sufficiently known. The science of education can and will itself contribute abundantly to psychology. Not only do the laws derived by psychology from simple, specially arranged experiments help us to interpret and control mental action under the conditions of school-room life. School-room life itself is a vast laboratory in which are made thousands of experiments of the utmost interest to "pure" psychology. Not only does psychology help us to understand the mistakes made by children in arithmetic. These mistakes afford most desirable material for studies of the action of the laws of association, analysis and selective thinking. Experts in education studying the responses to school situations for the sake of practical control will advance knowledge not only of the mind as a learner under school conditions but also of the mind for every point of view.

Indeed I venture to predict that this journal will before many years contain a notable proportion of articles reporting answers to psychological questions got from the facts of educational experience, in addition to its list of papers reporting answers to educational questions got from the experiments of the laboratory.

All that is here written may seem very obvious and needless, and meet the tragic fate of being agreed with by every one who reads it. I hope that it is obvious and needless, and that the relation between psychology and education is not, in the mind of any competent thinker, in any way an exception to the general case that action in the world should be guided by the truth about the world; and that any truth about it will directly or indirectly, soon or late, benefit action.

SOME MEASUREMENTS OF MENTAL FATIGUE IN ADOLESCENT PUPILS IN EVENING SCHOOLS[1]

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SUMMARY

In this investigation the tests of mental fatigue were made under actual school conditions and with school material. Classes were chosen which were as nearly homogeneous as possible. A class of artisans was tested with problems in arithmetic, a class of telegraph messengers with substance memory of a passage of prose, and classes of mixed occupations with shorthand exercises.

Each class was divided into two equal groups on the basis of a preliminary test, and each of these groups was then tested with the same exercise, the one group earlier, the other later in the evening. With the exception of a single, non-homogeneous class all the groups which were tested later in the evening showed a considerable reduction in mental ability as compared with the groups of the same class which were tested earlier.

The conclusion seems justified that evening schools, attended after long hours of labor, are comparatively unprofitable on account of the rapid decrease of mental energy in the pupil during the course of the evening's work.

PART I

I. WHY THIS WORK IS MOSTLY BASED ON SCHOOL EXERCISES

This, on the whole, is a practical paper. My aim is to show how, without expensive apparatus, some measure of mental fatigue in classes may be obtained under the ordinary conditions of school work.

[1] The results of the experiments outlined in this paper were given as evidence to the Consultative Committee of the English Board of Education in the Spring of 1909 and an abstract was presented to the British Psychological Society on May 1, 1909.

It is not because I wish to decry the more usual methods of psychological investigation that I have adopted the methods here employed—on the contrary I believe, in contradistinction to many educationists, that, from experiments with the simple and apparently trivial units of work with which psychologists usually deal, we can often draw direct and valid inferences which help us in school method, as well as conclusions as to natural ability—measured, of course, by these methods which, as Binet would say, are *extra-scolaire*. But there is no doubt that many teachers would hesitate to accept conclusions based upon work which they did not understand; so that, from the point of view of practical utility, it becomes important so to modify our psychological exercises as to make them coincident with, or similar to, the actual and usual work of the schools.

The difficulties are, of course, very great; we have to run the risk of lumping together a number of mental operations which are introspectively quite distinct, and are certainly partially distinct even when, as indeed mostly happens, their positive correlations are high. But the risk must be taken, because it is of extreme importance that teachers should understand and coöperate in this work.

2. HOW IT CAME TO BE DONE

When, in the summer of 1908, I was asked to give evidence before the Consultative Committee of the English Board of Education on the measurement of mental fatigue in schools, especially in relation to fatigue in evening schools, I found myself in a quandary. I knew I was to be asked what degree (if any) of actual mental fatigue was to be found in evening schools. The committee had had the most divergent evidence before it from teachers and others—who had, of course, attempted no actual measure of what they asserted to exist or not to exist. Some had spoken as if the pupil in evening school was exhausted throughout the whole session; others, I believe, had informed the committee that their pupils were so fresh that, even at 11 p.m., they could not get them to go home.

The committee had been informed that I had been for years carrying on experiments on fatigue in day schools, and they understood that I had found little evidence of any true fatigue. Was I prepared

to make the same assertion as to evening schools? Could I not, in the absence of direct personal evidence, argue by analogy that none existed? What evidence could I adduce from the experimental work done in other countries?

I had previously written to Professor Meumann in Germany and Professor Thorndike in America asking for references to work (if any) on fatigue with evening school students. None of any value appears to exist at present in either country.

Why is this? Mainly, I think, because it is so hard to get work done with adolescent evening school pupils which shall be *unwissentlich*. Nor do evening school pupils welcome innovation like day school pupils; they require to be satisfied that the thing is what they come to school for before they do it. This applies more particularly to mental work. I have no doubt that the boys would love to work an ergograph, and that both boys and girls would be interested in tests of sensibility. But ergographs cost money, and I had not enough trained observers to work the esthesiometric tests; so I was bound to fall back upon something which the students themselves felt was all in the night's work. Of course, as my readers well know who have experimented much with human beings, this was by no means wholly a disadvantage, as one avoided the spurts and alarming increases and decreases which sometimes characterize the first few of a series of new exercises.

3. THE PRECAUTIONS THAT WERE NECESSARY

But fatigue work in evening schools presents further difficulties. First of all, it is of little use to work with non-homogeneous classes, and most of our evening school classes are heterogeneous. Pupils of widely varying ages who are doing very different work in the day time, or even no work at all, are likely to vary so much that no steady or reliable results for the classes as wholes could be reached by any method. Fortunately, however, I was able to find some classes which were practically homogeneous.

There is a further difficulty—the number of teachers of evening classes who are willing to give thought, care and patient assistance to work of this sort is not so great as that to be found in day schools—

reasonably enough, for, under our present system of staffing evening schools, the work is *additional* to day school work; and teachers of evening schools have so little leisure that it speaks volumes for their enthusiasm that any could be induced to take up the work at all. Of course the difficulty of getting efficient coöperation is much diminished if the ordinary work of the classes is taken as a basis of the exercises given. But it must not be thought for a moment that anything like satisfactory results can be obtained unless the exercises themselves are set with unusual care in relation to the known abilities of the class, and unless the units of marking are chosen with a patience and discretion which is quite impossible in ordinary school work. And further, a degree of time and care must be spent in marking the exercises which no teacher could possibly give in his ordinary routine work. May I say that, in my judgment, the very unsatisfactory nature of much of the early work on correlation has arisen very largely from the ready acceptances of school-lists and school-markings as an adequate basis of scientific inference, and that the mental life of the child would not have been found to be quite such an uncorrelated and disconnected thing had this not been done?

4. THE SCIENTIFIC INTEREST OF THE WORK

I have said that this piece of work is of a practical nature, but there are one or two points of scientific interest which I may now briefly indicate, before proceeding to a detailed account of the separate exercises with the various classes in evening schools which undertook this work.

First, I have, I believe for the first time, employed the method of *equal groups* to the solutions of questions of fatigue.

Professor Thorndike, some years ago, in a piece of fatigue work with day school pupils of New York, the publication of which did much to prevent the German scare breaking out in America as it subsequently did in England, employed a somewhat similar method, but with an important difference. He took groups which were *prob-*

ably equal; I have investigated the question of equality at the outset. My groups are "objectively" found to be equal at the same kind of work as that given later on by which the different effects of different states of freshness or fatigue are to be judged.

Briefly, the method employed is as follows:—Divide a given class, homogeneous in social status and daily work, into two equal sections or groups, by the application of an exercise in some mental work which, to the students, will seem part of the usual routine; this exercise being given exactly in the middle of the evening school session. Having obtained the equal groups, give similar exercises in subsequent weeks, to one group half-an-hour earlier, and to the other group half-an-hour later. The comparative average results of the two groups (subject to certain statistical conditions) will give a measure of the extent to which mental power has increased or declined during the course of the evening session.

The second point of scientific interest lies in the complete disagreement of the results with those which would have been furnished by a *questionnaire*. All the teachers who helped me except one—men of long experience in day school and evening school work—maintained that the mental capacity of their pupils improved as the evening wore on. I can only suppose that they were misled by the greater *appearance* of interest and mental excitement which, of course, is itself an indication of approaching fatigue; for, in every homogeneous class, the group which worked later in the evening was found to be inferior—where the exercise was hard, very inferior—to the group which worked earlier.

A third point of scientific interest lies in the invention of a method of obtaining definite objective units for the estimation of substance memory. I believe this to be new, and as I have now worked with it for three years with perfectly satisfactory results, I introduced it to the Society with some confidence. It enables us to vary our units according to the synthetic power of the class or group whose mnemonic power we are testing; and this, in my judgment, will have very important bearings when we attempt definitely to correlate substance memory with other abilities.

A fourth element of scientific interest lies in the inference which we may draw as to the nature of fatigue. It is hard not to believe

that, had the later groups worked their exercises at the same time as the earlier groups, they too would have shown continuous improvement. There has been, we must suppose, in *both* cases, a growth in power to do the work, which possibly implies nervous molecular rearrangement; but the second group shows not only no improvement by practice but a falling-off from the standard of their own previous work. It would appear probable from this that fatigue may not imply a lack of the necessary arrangements of actual nervous tissue, but is, as common sense is apt to suppose, a matter of nutrition merely. I cannot say that I feel very confident about this; I throw it out to the Society for discussion.

5. A DETAILED ACCOUNT OF THE EXPERIMENTS

(*I.*) *With a Class of Young Male Artisans*

These pupils were almost all of them employed at engineering in neighboring works. They attended the evening school to study "workshop arithmetic." The work was not, however, confined entirely to arithmetic, as the exercises given will show. Each lesson in the subject lasted *two hours,* and it was possible for the students, if they desired, to put in per week three evening sessions of two hours each—their average attendance per week was actually about one and one-half sessions.

The experiments were made in the middle of the autumn session of 1908; the weather was good and the attendance quite satisfactory. It is necessary to state that some at least of the local employers offered additional emoluments to students who became proficient in workshop arithmetic; there was, therefore, a kind of indirect compulsory attendance.

The students were divided into two equal groups on the results of an exercise given on November 12, 1908. They began the exercise at 8:30 p.m., just halfway through the session, and were allowed half an hour for working it. No student knew that he was to be required to do this; but the excellent relations existing between the men and their teacher—a young man both discreet and enthusiastic—inspired the students to go at it with a will.

The figures in brackets after the problems show how many marks were given for each. They were decided on by a panel consisting of myself, the teacher, and the headmaster of a boys' school, whose boys were very proficient in arithmetic, but who was not connected in any way with this evening school.

The exercise given was as follows:

1. $3\frac{1}{12} + 1\frac{5}{8} + 4\frac{11}{16}$. (5)
2. $3\frac{4}{9} - 1\frac{7}{11}$. (5)
3. $4\frac{9}{10} \div 12\frac{5}{6}$. (7)
4. .01785 × 87.29 (any method). (7)
5. .03168 ÷ 4.208 (any method). (10)
6. A square field contains 1481.4801 square yards. Find the length of one side. (10)
7. Find the value of F if $F = \frac{m\,V - v}{t}$ when $m = 48$, $V = 60$, $v = -8$, $t = 34$. (10)
8. A room is 11 feet 6 inches long, 13 feet 6 inches broad and 10 feet high. Allowing 100 square feet for the doors and windows, what number of square yards of paper will be required? (15)
9. A triangular glass with sides of 5 feet, 4 feet, and 3 feet, is silvered. Find the cost of silvering it at 3 pence per square foot (15)
10. A room is 16 feet long, 12 feet broad and 10 feet high. A fly wishes to *crawl* from one bottom corner to the opposite top corner. What is the length of the shortest path by which it may go? (20)

The detailed results follow:

TABLE I

Showing the Individual Results of the Preliminary Exercise

NAME INITIALS ONLY	AGE ON 31/12/08		OCCUPATION	NO. OF MARKS GAINED FOR 10 SUMS WITH A MAXIMUM OF—										TOTAL MARKS	GROUP IN WHICH PLACED
				5	5	7	7	10	10	10	15	15	20		
	Yrs.	*Mos.*													
L. P.	16	0	Instrument mounter	5	5	7	7	3	10	10	15	7	10	79	A
T. C.	16	1	Instrument mounter	5	5	7	7	10	10	..	15	..	20	79	B
P. J. E.	19	9	Tool maker	5	5	7	6	10	10	10	15	..	..	68	B
H. J.	19	0	Machine miller	4	5	7	..	10	10	10	..	7	10	63	A
H. D.	22	6	Calibrater	5	5	7	7	8	..	10	15	..	..	57	A
B. W.	17	3	Instrument mounter	..	5	7	7	10	10	..	15	..	10	64	B
L. H.	14	2	Carpenter	5	5	7	7	9	10	10	..	..	..	53	A
H. W.	25	3	Calibrater	5	5	7	7	10	..	10	..	..	..	44	B
P. A.	18	1	Machine miller	5	5	..	5	9	10	9	..	..	..	43	B
H. G.	20	0	Machine miller	5	2	6	7	10	..	..	..	..	..	30	A
P. S.	21	3	Baker	..	5	..	7	..	..	..	..	..	..	12	A
F. T.	15	1	Instrument maker	5	..	..	7	..	..	..	..	..	..	12	B
F. J.	17	10	Butcher	5	5	..	..	..	..	..	..	..	..	10	B
P. G.	15	7	Messenger	4	..	4	..	..	..	..	..	..	..	8	A
H. J.	27	1	Machine miller	0	..	..	..	..	..	..	..	..	..	0	B
H. S.	15	3	Builder's lad	0	0	..	..	..	..	..	..	..	..	0	A

The students were then divided into two equal groups on the basis of these results.

TABLE II

Showing the Equal Groups

"A" GROUP	MARKS	"B" GROUP	MARKS
L. P.	79	T. C.	79
H. J.	63	P. J. E.	68
H. D.	57	B. W.	64
L. H.	53	H. W.	44
H. G.	30	P. A.	43
P. S.	12	F. T.	12
P. G.	8	F. J.	10
H. S.	0	H. J.	0
Total	302	Total	320

We had now obtained not only approximately equal groups, but we had also been fortunate enough to find individual pupils in the two groups who closely corresponded with each other in ability. The first, second, sixth, seventh, and eighth of each group are practically identical, whilst L. H. and H. G. may not unfairly be looked upon as together equivalent to H. W. and P. A. Group B is somewhat the stronger and the older group.

The next exercise was given on December 3. Group A began at 8 p.m., and Group B at 9 p.m. As before, half an hour was allowed for working the exercise. Before and after the exercises the students of both groups did routine work in arithmetic and algebra, but were taught nothing new. The exercise given and results follow:

Exercise given to Group "A" at 8 p.m. and to Group "B" at 9 p.m. on the third of December, 1908:

1. $6\frac{7}{8} + 3\frac{4}{5} + 1\frac{1}{3}$. (5)
2. $4\frac{3}{7} - 2\frac{4}{13}$. (5)
3. $8\frac{7}{16} \div 3\frac{4}{15}$. (7)
4. $.03576 \times 42.75$ (any method). (7)
5. $.005581 \div .0672$ (any method). (10)
6. A rectangular plot 150 feet by 24 feet is converted into a *square* plot with the same area. Find the length of one side of the square. (10)
7. If $R = \frac{E}{C}$, find C when $R = .0287$ and $E = 2.38$. (10)
8. Find the expense of paving a pathway 6 feet wide round the outside of a rectangular tennis court 63 feet by 30 feet, at $9\frac{1}{2}$ pence per square yard. (15)
9. If a man can row 3 miles an hour *against* a stream, the rate of which is $2\frac{1}{2}$ miles per hour, how far will he row in 6 hours with the stream? (15)
10. Two flies were discussing distances, and one said that if he crawled round a circle which touched a square at each of its 4 corners, it was shorter than going round the sides of the square itself. The other fly said it was not. Which was right? Suppose the square had a 10 foot side, how much farther was it one way than the other? (15)

TABLE III

Showing the Results of the Exercise Worked by Group A and Group B at 8 p.m. and 9 p.m., respectively

NAMES IN "A" GROUP	NO. OF MARKS GAINED WITH MAXIMUM OF—										TOTAL MARKS
	5	5	7	7	10	10	10	15	15	15	
L. P.	5	5	7	7	10	10	10	15	15	15	99
H. J.	5	5	7	0	10	0	10	0	15	15	67
H. D.	5	5	7	7	10	10	10	5	.	.	59
L. H.	4	5	7	7	10	10	10	.	.	.	53
H. G.	5	5	7	7	10	8	0	.	.	.	42
P. S.	5	5	7	7	2	.	.	.	.	.	26
P. G.	0	5	7	.	.	0	.	.	0	0	12
H. S.	5	0	.	.	.	.	.	.	0	.	5
Total											363

NAMES IN "B" GROUP	NO. OF MARKS GAINED WITH MAXIMUM OF—										TOTAL MARKS
	5	5	7	7	10	10	10	15	15	15	
T. C.	5	5	7	7	10	10	5	15	0	15	79
P. J. E.	5	5	0	7	10	10	8	.	.	12	57
B. W.	4	5	0	7	10	10	0	0	.	7	43
H. W.	5	5	7	7	10	10	0	.	.	.	44
P. A.	5	5	7	7	10	.	.	0	.	.	34
F. T.	5	0	7	7	0	.	.	.	.	.	19
F. J.	5	5	0	.	.	.	.	.	.	.	10
H. J.	0	.	.	.	.	.	.	0	0	.	0
Total											286

We are now in a position to compare the work done in the preliminary exercise with that done in the final exercises by both groups of students.

TABLE IV

A Comparison of the Work of Groups A and B

NAMES IN "A" GROUP	MARKS GAINED IN FIRST EXERCISE	MARKS GAINED IN SECOND EXERCISE	NAMES IN "B" GROUP	MARKS GAINED IN FIRST EXERCISE	MARKS GAINED IN SECOND EXERCISE
L. P.	79	99	T. C.	79	79
H. J.	63	67	P. J. E.	68	57
H. D.	57	59	B. W.	64	43
L. H.	53	53	H. W.	44	44
H. G.	30	42	P. A.	43	34
P. S.	12	26	F. T.	12	19
P. G.	8	12	F. J.	10	10
H. S.	0	5	H. J.	0	0
Totals	302	363	Totals	320	286

I suggest that this table is remarkable for its regularities and the uniformity of the inferences which we can fairly draw from the work of corresponding pupils.

Not only do the students of Group B do inferior work to those of Group A, but they do less satisfactory work than they did three weeks previously in the preliminary exercises; and that is true not only on the average, but also in every individual case but two; whereas, in Group A, every individual but one improves on his former record L. H. and H. W. stand still; in every other case, the members of Group A go up, the members of Group B except F. T. go down.

The work done at 8 o'clock is 25 per cent better than that done at 9 o'clock; in fact, so great is the mental inability at 9 o'clock that improvement by growth and practice, which we are entitled to infer has occurred, has been completely masked by the fatigue effects.

(*Part II will appear in the February number.*)

THE CLASS EXPERIMENT.[1]

CARL E. SEASHORE

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There are four ways in which we may teach psychology by experiment: (1) the regular technical laboratory course; (2) the exhibition experiment before a class; (3) the individual experiment without apparatus; and (4) what I shall call the class experiment.

The first of these, the laboratory course, has no place in the elementary course—say a course of five hours for one semester or three throughout the year. Those teachers of psychology who proceed upon the analogy of physical science and begin with the technical experiment are doomed to learn a lesson. My lesson may be summed up in these three propositions: the student is not ready for it; the elementary classes are too large to be handled in that way; and the technical laboratory experiment is worth while only to those who are both capable and willing to take psychology seriously.

The second method, the exhibition experiment, may be used in the widest range; and this is of course the principal method in vogue. It admits of the greatest variety of experiments, it takes but little time, furnishes light entertainment, and is usually approved by the student because it is easier to sit by and see a thing done than to do it. This method with its advantages and weaknesses, we shall probably continue to use for certain purposes; but I am disposed to reserve it for residual experiments which cannot by any means be made effective in the third and fourth types of experiment.

The third type of method, the intensive individual experiment without technical apparatus, is the one which can best be justified by psychological pedagogy. It is a universal principle of invention that, other things being equal, the simpler is the better. This is

[1] Read at a conference on the teaching of psychology, in Chicago, April, 1909.

particularly true in the case of psychological experiments. The simpler the machinery to be manipulated, the better. But of this third method I shall not speak, because some of the merits and possibilities of that plan are set forth in my recently published manual of elementary experiments.

I desire to advocate an extension of the principles underlying this third method into what I call the fourth method, the class experiment. This involves three fundamental principles: (1) every individual student shall take active and responsible part in the experiment; (2) the experiment shall be sufficiently intensive to make it vital; and (3) each step in the experiment shall be explained and interpreted.

I dare say no one will question the pedagogical soundness of these principles. The question will be: Can they be applied? Can we devise class experiments which shall comply with these exacting conditions? I venture to say that, although no considerable number of such experiments are in use, it is possible to develop a series. But granted that it can be done, what will be the gain?

In order to get the situation before us, I shall take an example with which I am familiar, having used it very successfully in this way for several years; namely, the measurement of discrimination of pitch of tones. The problem is to determine the threshold of discrimination with a fair degree of accuracy for each individual in a large class in a single hour.

I have used different instruments, most frequently a set of tuning forks tuned for certain intervals, also a dichord (a very heavy, metal-stringed instrument) or Stern's tone variators. All of these instruments can be heard distinctly in a large lecture room. Each student is furnished with a mimeographed or printed blank which gives form to the record. The intervals are sounded in a definite order according to a key in the hands of the instructor. The student is required always to record H or L according as the second tone in the pair was higher or lower than the first. Usually ten increments are so chosen that they shall include the probable range of thresholds in the class, say from ½ to 30 vibrations on a standard of 435. Every student has to record every trial but I always begin with the largest increment and take them in the order of decreasing magnitude. When a student has come below his threshold, he must continue by

guessing. After about twenty-five trials, I read off the key and allow each student to check his record. This gives him an orientation and increases his zest for a good record, and the change of work furnishes a needed rest. I am usually able to make about 170 trials in the hour by a modification of the method of right and wrong cases developed specifically for this purpose. This number of trials will furnish satisfactory data for a determination.

At the next hour the method of footing up results is explained. Someone is delegated to work up a report of the results for the class and the full setting and significance of the record is discussed.

In connection with this each student is asked to fill out a blank, which is furnished, containing a series of classified questions that direct his attention to the various elements involved in his musical ability from the point of view of his own observation. If the problem is one of special interest, these questionnaire reports may be collated with the individual records for the class. It is made clear to the student that the measurement may be one of a score or more measurements on his musical ability.

What then is the value of this kind of experiment? There are three elements in the first principle mentioned: (1) that an experiment shall represent individual experience; (2) that the individual shall be active; and (3) that personal responsibility shall rest upon each individual. These are characteristic of a good laboratory course.

In the example just given, each student makes his own observation independently, just as if only he and the experimenter were present. He has most of the advantages of the observation side of the laboratory experiment and is freed from the accessory technique of the experimenter. (Most of the time in a laboratory course is spent in mastering the manipulation of the instruments. Here the student need not burden his mind with that. The instructor does it once for all for each individual in the class.) He must be active every moment, to grasp the directions, to listen, to discriminate and judge, and to record each trial. He must act critically in checking the results. He must make note of peculiarities in his experiences, disturbances, etc. He is responsible for his acts for every moment of the hour. He has to work hard. Students tell me that an hour of such observation is extremely hard work, because the task is new and it is a question of sink or swim at every moment.

This, then, makes a model period of discipline in psychological observation. Instead of seeing or hearing about the experiment, the student does it. Furthermore, he has here to measure his own ability in a capacity which interests him. He will seek to compare his record with norms as to the average ability, the variations with age, sex, training, interest, etc. He will inquire into its practical significance. He will realize that he has gotten at a psychological fact. He is active and warm over the situation so that an abundance of illustrative and theoretical description may be gathered around this bit of systematic experience. He has done one thing well and can now understand how related things may be experienced or done in the same way.

Then with reference to the requirement of intensive work, we have a good illustration in this case. It takes an hour to make a really satisfactory measurement and here the hour is devoted to this measurement undisturbed. The experiment gets a character of solidity and worth. But it would be a failure, unless other intensive features were carried through. I have reference to the working up of the results and the explanations and interpretations of their meaning. The student has to master a method of footing the results. He will work out a measure of the reliability of his record. This reliability-measure is an object of interest in itself aside from the record of his discrimination and is quite as important a psychological fact. Then he has to fill out the questionnaire which by itself teaches him a good deal about the significance of a pitch test and trains him in reporting psychological facts which are so closely interwoven with practical life that he may not have thought of them as psychological whatsoever. Again, the report for the class, the description of the setting of the experiment with reference to related problems and the theoretical discussion of the significance of such a measurement are all germane to the original measurement. These features are simply the carrying out of the intensive idea of doing one thing well.

I have given the experiment a number of years in this way, and have found it an especially attractive and profitable feature in the course, but on account of absence of available literature on the subject, I have been compelled to take a second hour for the directions, computation, description, and interpretation. This could not be done if we should have any considerable number of such experiments. It therefore

seems to me that one condition for the success of such a series is that all the necessary directions, explanations and interpretations must be furnished in print to the student. That text could also include the record blank and the questionnaire.

If this were done, it would be possible to take a single hour for the actual measurement and to give all the rest of the work as a home assignment. It would represent enormous economy and I think that the amount of psychological training furnished in one such hour with the customary preparation for an hour, could well challenge comparison with achievements by any other known methods.

If all these claims are true, the class experiment is worth while. It can be made an artistic, economic and impressive lesson, but of all our devices for teaching, this would require the greatest amount of preparation. In the first place a well adapted set of the apparatus must be put on the market in a good commercial form. In the second place, a psycho-physic method must be designed to fit this particular apparatus and the conditions of the experiment. And in the third place, the explanation, etc., must be well written up. That task is not the task of one individual alone, nor can it be done well at once. Each experiment could very well be delegated to one who has specialized on the subject with years of time to work it up. I have spoken with some confidence about the experiment in pitch because I am spending years, collaborating with others in the attempt to develop the technique, etc., of this particular experiment.

How many such exercises could be introduced depends upon how seriously psychologists would coöperate in this direction. I have thought of several ways in which it could be done. One way would be for one psychologist to attempt, single handed, to enlist such coöperation as would be needed for the production of a manual. Another, and I think a much better way, would be for some general body such as the American Psychological Association to appoint a standing committee of editors of a series of leaflets which could grow and change just as a card catalog grows and changes. This committee could set a model to secure uniformity and fulfillment of fundamental conditions, e. g., each exercise shall be such as can be performed in one hour in compliance with such pedagogical principles as those I have instanced here and the text shall contain record blanks, directions, explanations,

interpretations, etc., enough to make a proper home assignment of two hours, which is the customary time allowed in preparation for a lesson in colleges and universities. It would also contain specific directions to the instructor about the apparatus and method. Each exercise could be printed on the octavo page making about sixteen pages counting the cover. These folders would accumulate into a series and might be sold to the students for five cents apiece or thereabouts. The instructor would then have the opportunity of directing the students to buy, just as text-books are bought, such numbers in these series as are desired and the equipment might permit.

Such a series could be kept perpetually alive. The instructor would select and place sufficient sets of what he desired in the library or the student would purchase only such part of the series as would actually be used in a given year. Each folder would survive or die on its own merits. Revisions and additions would be made continually, under the supervision of the editing committee.

Such a series would embody pedagogical economy and efficiency in at least the following respects: (1) a mastered experiment; (2) time-saving in the home assignment; (3) each experiment bringing the enthusiasm and insight from the chosen field of some investigator; (4) the standard apparatus, and (5) the live, or card catalog feature of the series.

And this is not a visionary scheme. We have the need. We have the spirit of coöperation among psychologists. We have more than a score of psychologists who would be willing to prepare a model exercise of this sort. The cost to the laboratory would be minimal. Such coöperation represents to me the true spirit of the scientific attitude in teaching and it would do much to put the teaching of elementary psychology upon a higher plane.

COMMUNICATIONS AND DISCUSSIONS

THE SPELLING OF UNIVERSITY STUDENTS

As a teacher of university classes, both in psychology and education, I have naturally been interested in the mistakes in spelling committed by my students, as these mistakes often throw light upon the nature of the mental processes underlying the use of language, and at the same time indicate in a general way the degree of efficiency of the public school training in spelling. For these reasons I have for several years kept a record of the words most commonly misspelled by members of my classes.

Perhaps I am becoming hypercritical, perhaps my field of observation is too limited, and my "samples" unrepresentative, but I have the conviction that present-day college students spell far less accurately than did those of a decade ago, and I infer that the teaching of spelling in the schools must either be deprived of its proper allotment of time or be conducted by inadequate, if not incorrect methods.

To illustrate this contention, I shall make use of a list of 160 misspellings, culled from 58 examination books written by students of all four classes in a certain western university. For the sake of putting these errors in high relief, I shall assume that a single student is guilty of them all. Let us suppose that he is a senior, clad in cap and gown, brandishing his coveted sheepskin, and that, as his favorite aunt was unable to attend the Commencement exercises, he thoughtfully indites the following epistle in review of his college days and discussion of his future plans:

DEAR AUNT: Today I recieved my diploma, and now, thank fortun, I am educated. I have not yet intirely detirmined my carere. Wheather I shall finaly earn my livlihood by going into the solliciting buisness as my uncle's pardoner will dipind on his perferences. At any rate, laborous and humuliating manuel pursuits are furtherest from my intentions, as I am concious allready that the university invironment has prooved particulary valuable to me in evry way. My intellegual equippement has been advansed harmonously; by immetation of the best sholars my vocabular has been strenghthened; suberstitions allmost as bad as those of the heathern have been analised and prooved incorect to me; my inaetiative has been arroused and intencified; socialy I am well acquiped and incidentily the rough eges

I used to show have been eleminated; again, the dicipline I have recieved from the pratice work in the labratories of physsics and chemistery, where persistance courtsy, couragiousness and similar quallities are definately emphazed, and the knowlege I have recived from the lecturs and disscussions of my proffessors in bonay, rhitoric, mathmatics, phisiology, ect. shoud be a sourse of inestimatible benifit to me from whatever angel it is regarded. In fact, aunty, untill you have been here, you would never suspicion how desireable and influencial a college eduecation is even to a person who has been given by heridity a meerly adverage amount of nural placticity and a comparitively poor mental calaber. In the light of my pratical expirience, however, I can testify that a college education is alright.

It is to bad that the epedemic of diptheria and scarlet tina and the confussion and fuss of fumugation shoud have involentarily kept you from comming ro the exersices. You inquire about my helth: during my course, as you probibly remember, I have been ill but seldem; an attack of measeles with some nauseau and other unpleasant symtoms during the Christmas hollidays, and one spell of thrachoma, due, I think, to my astigmation, are the only deseases I have had, as this is a very intelegent and hygenic city, notible for its clenliness. One of my friends, however, an enginiere, has not had the happeist lot; he lived in a room oppisete mine, with a very low cieling, where tramsons were the only devises for ventalating, and even these were ordinarally neclected, as they were of no earthy use. Hense he was unable to brake up an attack of typoid, and was compeled to loose quite a bit of his scholl work. They could not trace the sourse of the desease itsself, but put him under quarentine, as they said he might be a neucleus or focas for the developement of other cases.

I have to go out now to walk for a peace with my chum, so good-by,

Your obeident nephew,

Now, I submit that such spelling as this (and let it be understood that these are bona-fide errors), even when regarded as the summation of the inaccuracy of several dozen students, is totally unwarranted. By hypothesis, college students represent a selected group—selected for their intellectual attainments and capacity to profit by their college training. But ability to spell, like ability to use fluent and idiomatic English, is a well-nigh indispensable prerequisite to culture and to success in practical life. Spelling, to be sure, can scarcely be termed a cultural study; it is rather a tool for the attainment of culture, but it is a most necessary tool. Yet, if one were pessimistically inclined, one might imagine that the average college graduate had never learned the use of this tool.

It will probably be objected that the greater portion of the errors I have produced were accidental, attributable to the haste of examination work. To this it may be replied: first, that I have not included here errors that were of a certainty mere "slips of the pen;" second,

that most of the errors were repeated errors, *i. e.*, that they were committed several times in the paper or by several students; third, that in all my classes I demanded a revision of the papers before they were submitted and placed special emphasis upon the detection of errors in construction and orthography, while in two classes a dictionary was provided for free consultation by the students; fourth, and most important, speaking psychologically, one cannot claim to "know" a word until one can spell that word automatically and correctly, however much one's attention be taken at the time with matters of thought and diction.

In short, the goal in the teaching of spelling should be—ability to write automatically and correctly all the words common in everyday experience, and this goal, obviously, should be attained in the grammar grades. As to the means for its attainment there, it is not my place now to speak, even had I sufficient knowledge to do so. I am told, however, that large numbers of teachers and superintendents have been impressed with a sort of *laissez-faire* doctrine in spelling, have revolted from the old-fashioned drill, and have argued, either that it doesn't matter how one spells, or that spelling will be absorbed incidentally by the "natural-born spellers" and can't be taught to the rest. Still others cling to drill, but the drill is of the lifeless, mechanical, time-consuming sort that has been so justly condemned.

The only way to meet these difficulties is to take the matter seriously and to devote intelligent thought and energy to the teaching of spelling. I cherish the idea that if teachers only knew how to teach, we could attain the goal I have mentioned and could train prospective college students to a higher degree of accuracy than is at present exhibited.

GUY MONTROSE WHIPPLE, PH.D.

Cornell University.

TWENTIETH ANNIVERSARY OF CLARK UNIVERSITY

At the recent scientific meetings on occasion of the Twentieth Anniversary of Clark University most of the lectures and discussions in the departments of psychology and pedagogy were concerned with subjects in the field represented by the JOURNAL OF EDUCATIONAL PSYCHOLOGY. Lectures were given by distinguished psychologists from this country and Europe, and conferences in regard to the problems of teaching and research were held.

The characteristic marks of recent progress in psychological science are the trend toward useful applications and toward analysis of the more complex mental phenomena. The first of these and in a measure the second also were exemplified in the four lectures of Prof. William Stern of the University of Breslau—himself one of the leaders in the new developments. In the first two the psychology of testimony was taken as the type of applied psychology and the matter was treated with a refreshing reserve and modesty, as though dealing with hopeful beginnings rather than with a perfected method which the legal profession ought instantly to adopt.

Professor Stern's last two lectures dealt with the complicated matter of individuality, especially with the efforts which he and his *confrères* have been making to obtain a systematized scheme for describing and recording —"psychographing"—concrete human personalities. Here no great advance has as yet been possible because of the frightful complexity of the subject. With reference to the connected but less difficult problem of grading children for school purposes according to ability, progress enough has been made to provide a practicable method (that of Binet), a hopeful feature of which is that in the end we may be able not only to separate out the dull and stupid for special assistance, but also to discover those of exceptional endowment and to provide them early with opportunities equal to their powers,—and this not only as a matter of kindness to the child, but of the greatest practical importance for the race, which advances in the paths opened up by its geniuses.

Professor Titchener's first lecture was an historical retrospect upon the course of the science through the last decade; his second, on the psychology of the thought processes, brought out another aspect of the trend already mentioned toward the analysis of the higher mental powers.

The lectures of the other guests of the psychological group—Professors Boas, Burgerstein, Freud, Jennings, Jung and Meyer, served to emphasize afresh the width of the field that psychology claims and the interest and variety of the problems engaging research in its different parts.

Two conferences on the teaching of psychology were held. One, under the chairmanship of Dr. Whipple, discussed the subject of Psychology in Normal Schools; the other led by Dr. Seashore was devoted to Psychology in the College Curriculum.

In the department of education the lectures treated especially school hygiene and mental hygiene; the conferences discussed school hygiene,

research in education, and the training of teachers. The lectures on school hygiene were given by Dr. Leo Burgerstein of the University of Vienna, probably the foremost authority in the world on this subject. The special topics treated were: present problems in school sanitation and the hygiene of instruction, co-education in relation to hygiene, and certain aspects of the fatigue problem. Even to some of those not especially interested in the subject it seems to have been interesting and somewhat surprising to hear such topics in school hygiene as seating and methods of writing discussed in a scientific manner. As Burgerstein's study of work and fatigue in school children reported in his classic paper, on the Curve of Work for a School Hour, read before the London Congress of Hygiene and Demography in 1891, was with the exception of Sikorsky's paper the first extended investigation of fatigue in school children, special interest attached to his résumé and critique of investigations in this field.

Lectures on the Psychology of Association and Mental Hygiene were given by Dr. C. G. Jung of the University of Zürich. In this course Dr. Jung presented and illustrated his *diagnostische Assoziationsmethode.* Interesting as these lectures were for the direct results presented, they were still more significant, perhaps, because they suggested the possibility of establishing a truly mental hygiene based upon scientific principles.

In the educational conferences led by Commissioner Brown, Dr. Dresslar and Dr. Storey, with much diversity of opinion, nevertheless emphasis was placed upon the need of greater attention to school hygiene in courses for teachers and the great importance of research both in education and school hygiene.

Even the lectures in psychiatry given by Prof. Sigmund Freud of the University of Vienna were not without educational and hygienic as well as psychological significance. Special interest attached to these lectures in large part on account of the interesting personality of the lecturer. The correspondent of the New York Nation wrote of him as follows:

> . . . . A pupil of Charcot and Westphal, he has developed what may now almost be called a new system of psychology, which seems to a growing number of workers in this field, of whom the writer is one, to be the best word yet spoken there. . . . . It is difficult to give, in brief and lucid phrase, any adequate conception of a system that has so many details and even technicalities. It seems certainly to go distinctly beyond Janet; and if it be confirmed, it plays havoc with many of the systems of both philosophical and of laboratory psychology. Some general idea of what it means might be suggested as follows: Dr. Freud does not accept conscious-

ness as the oracle of the soul in any such sense as does modern psychology of the type, e. g., of Wundt or James. More likely, he would say, consciousness never says what it means, but must always be interpreted. It is rather essentially superficial and misleading. It is a compromise between the real nature of the soul and its environment, which is at so many points repressive. Dreams, for instance, are the springing up into consciousness of various undeveloped or repressed remnants of the daily activity, and if the missing links can be supplied, they are not only rational but of the highest interpretative value. Wit is another key to the activity of the submerged self; so are automatic actions, unintended errors of speech, inflection, etc. Freud is the father of the psychoanalysis, one aspect of which has been popularized in this country by Münsterberg in the Harry Orchard case. He is also the father of something very like the hypnoidization of Sidis, which, instead of hypnotizing the patient, asks him merely to sit in absolute quiet and mention whatever thoughts occur to him, which, no matter how apparently irrelevant, are always shown by a little interpretation to be very much in point.

The following specialists in psychology and related subjects received honorary degrees:

Franz Boas, professor of anthropology in Columbia University, doctor of laws.

Hermon Carey Bumpus, director of the American Museum of Natural History, doctor of laws.

Leo Burgerstein, University of Vienna, doctor of laws.

Sigmund Freud, University of Vienna, doctor of laws.

Herbert Spencer Jennings, professor of experimental zoölogy in Johns Hopkins University, doctor of laws.

Carl G. Jung, University of Zürich, doctor of laws.

Adolf Meyer, professor of psychiatry in Johns Hopkins University, doctor of laws.

William Stern, University of Breslau, doctor of laws.

Edward Bradford Titchener, professor of psychology in Cornell University, doctor of letters.

Charles Otis Whitman, head of the department of zoölogy of Chicago University, doctor of biology.

E. C. Sanford,
Wm. H. Burnham.

Clark University.

THE NATIONAL CHILD CONFERENCE

At the invitation of President G. Stanley Hall a Conference on Child Welfare convened at Clark University, July 6 to 10. As a result of the deliberations of that conference a permanent National Child Conference was organized, which aims to establish in each city a city conference or bureau and in each state a state conference or bureau for the correlation of existing local movements for child welfare. It will further in each locality a survey of all conditions and social movements affecting children, and will endeavor to work out a comprehensive plan for the promotion of the interests of children along all approved lines. These local conferences will seek to strengthen the work of existing organizations, and to cover neglected fields, either by securing an extension of the work of these organizations, or by organizing new committees or associations. As far as finances or conditions make it possible, each local conference will maintain a research department for the investigation of such local conditions as promise practical results for social progress. It will endeavor to present to the local public through the press, lectures, and special bulletins the latest results of scientific child study and the most approved methods of dealing with child problems.

As soon as finances permit, the National Conference may publish a magazine on child welfare, which will seek to formulate comprehensive plans for the solution of child problems in each locality. It will popularize the latest scientific study of children and summarize the progress made by child welfare organizations.

Each year a National Conference on Research and Welfare will be held, to which all child-helping agencies will be asked to send representatives. At this meeting the status of each of these movements will be presented and the results of the most significant studies of children will be reviewed. It is deemed desirable that the National Conference should also establish either a summer school or a permanent school for the training of practical workers for the various child-helping movements in order that those who undertake the work may be equipped with a more fundamental knowledge of these movements, may have a better understanding of child nature, and may be more familiar with the methods of investigating children's problems.

HENRY S. CURTIS.

Worcester, Mass.

THIRD INTERNATIONAL CONGRESS FOR HOME EDUCATION, BRUSSELS, AUGUST 21–25, 1910

While the significance of the home in the formation of character has never been questioned, the important task of organizing the forces of home education and capitalizing the most valuable results of experience and investigation in this field has only recently been undertaken. This movement, world-wide in its extent and significance, was initiated by the Belgian government, and bore its first fruit in the International Congress for Home Education which convened at Liége in 1905. A second congress was held in Milan in 1906, under the patronage of the Italian government.

These two congresses have shown the very great value of a persistent and systematic study of the problems involved in home education. The published Proceedings fill a unique place in educational literature and form the nucleus about which the future science of home education will develop. It is, therefore, gratifying to note that the movement has been given another forceful impetus by the calling of a Third International Congress for Home Education to convene in Brussels August 21–25, 1910. The congress will be held under the patronage of the Belgian government, and in connection with the Universal Exhibition of Brussels.

It is expected that the programme will lay especial stress upon the problem of preventing, through a proper direction of early education in the home, the development of the unsocial and otherwise inadequate standards and ideals which so often take root in a neglected or poisoned soil. As the preliminary circular of the congress says:

> The greater part of the efforts of those who seek to correct defects, to relieve distress, and to rectify mistakes, are not successful because they are undertaken too late.

The congress will consist of five sections

Section 1. The study of childhood.

Section 2. The education of children; (*a*) general questions; (*b*) the education of children by their parents in the home; (*c*) coöperation of the family with the school; (*d*) education in the home after school.

Section 3. Abnormal children.

Section 4. Various subjects relating to childhood.

Section 5. Documentation.

An American Committee has been appointed at the request of the Belgian government by Hon. E. E. Brown, United States Commis-

sioner of Education, to stimulate interest in the work of the congress. This committee has organized a number of sub-committees, each representing one of the sections of the congress. An effort will be made to secure a large American representation in the sessions at Brussels.

Membership in the congress entitles to a copy of the Proceedings. The membership fee is $2, and may be sent either to the General Secretary, 44, rue Rubens, Brussels, or to the Secretary of the American Committee.

Administrations, educational bodies, philanthropic societies, can take part in the congress and be represented by a delegate. A subscription must be paid for each delegate.

Those who subscribe not less than $10 become honorary members. Subscriptions of this type are needed to defray the general expenses of the propaganda.

Papers and discussions may be presented in any of the following languages: French, German, English, Dutch, Italian and Spanish.

Americans wishing to participate in the discussions of the congress should communicate with the Secretary of the American Committee, W. C. Bagley, Urbana, Ill.

ABSTRACTS AND REVIEWS

ERNST MEUMANN. *Vorlesungen zur Einführung in die experimentelle Pädagogik und ihre psychologischen Grundlagen.* (Leipzig: Engelmann, 1907. Vol. i, pp. xviii, 555 and vol. ii, pp. viii, 467.)

Educational research is manifesting at the present time three important tendencies, the study of social and moral education, the employment of statistical methods, and the application of the methods of experimental psychology to educational problems. Professor Meumann's two volume work is the most valuable and complete contribution made thus far to the last of these three tendencies. He has brought together in a systematic way the investigations in this field and designated them as experimental pedagogy or education.

The writing of the treatise was occasioned by lectures which the author delivered to several teachers' associations in Germany. The work embraces the following main topics.

Lectures I and II state the function and problems of experimental education. Its function consists in giving the educator a factual basis for his pedagogical principles.

Lectures III to VII deal with the development of the child. The first of these lectures is devoted to a summary of the more familiar facts about physical growth, while the other four lectures consider the development of the different mental capacities. After defining the meaning of general and specific capacities the author proceeds to trace the growth of attention, pp. 76–94; of perception and discrimination, pp. 95–124; of apperception and the range of ideas, pp. 128–169; of memory, pp. 170–203; of thinking and imaging, pp. 204–256; of speech, pp. 257–274; of emotion and volition, pp. 275–311.

In connection with each topic the author describes and criticises the various experimental methods that have been employed by different investigators and then summarizes the results and their educational bearings. Particularly worthy of mention are the excellent analyses of mental processes and the relative evaluation of various experimental methods. The results, however, are not as exhaustively summarized as the reader might desire. Important researches are occasionally

omitted or barely mentioned. This may possibly be excused on account of the lecture form of the book.

Lectures VIII to X are concerned with mental ability (Begabungslehre) and individual differences. Meumann defines the concept of individual differences and describes the types of individuals with respect to thinking, imagery, attention, apperception, and mental deficiency. Here again the critical analyses of the methods of determining types and of measuring mental ability are especially valuable. As an illustration may be mentioned the exhaustive outline of the different ways of determining types of imagery in thinking, pp. 451–484. The practical bearings upon education are usually stated conservatively.

Lecture XI considers the mental work of the child, including methods of measuring mental work, economy of learning, conditions of practice, etc.

Lecture XII is on the mental hygiene of school work, including a full discussion of the means of measuring fatigue.

Lectures XIII to XVII are devoted to the more practical problems of school exercises. The first of this group of lectures points out the relation between experimental education and school instruction. The other four lectures deal respectively with reading, writing, arithmetic, and drawing. The psychological factors in each are analyzed and the methods and results are summarized together with their pedagogical applications.

The final lecture gives a general survey and a prospectus for further educational research. A bibliography, classified according to the topics of the lectures, is added at the end of each volume. The second volume also contains an index.

In the writing of this treatise, Professor Meumann has rendered a distinct service; for the student of educational psychology, on the one hand, he has presented an outline of the results of investigations and their practical import; and for the investigator, on the other hand, he has analyzed the problems and discussed the experimental methods of approaching these problems.

DANIEL STARCH.

University of Wisconsin.

HUGO MÜNSTERBERG. *Psychology and the Teacher.* (New York: D. Appleton and Company, 1909. Pp. 329. $1.50.)

This is perhaps the most notable book on education since James' *Talks to Teachers*, but, unlike that, it seeks in outline to cover the whole field of instruction. Part I treats of the ethical aims of education, Part II of educational psychology, and Part III of practical applications in the schoolroom.

The two most striking features of the treatment throughout are, first, concentration upon a few central themes, and second, lucidity of exposition. The book is not designed to render the remainder of our educational literature superfluous, but to furnish perspective, and a guide to values.

The leading theme of Part I is that, not pleasure, but abiding ideal values must constitute the aim of education. In unfolding this conception, our author has surpassed even his own attested power of transparent exposition, so that he leads the novice in thinking up into the heights of ethical theory without allowing him to suspect that the atmosphere has become rare.

Beginning with a clear distinction between facts and purposes in Ch. II, and continuing in Ch. III with a demonstration of the ethical worthlessness of pleasure as an end of conduct, the author pricks some pretty bubbles, such as the idea that we shall ever find the true aims of education in the impulses or desires of the child, or truly educate him by catering blindly to his so-called "interests" alone. Only the eternal ideal values that make truth what it is, give unity and harmony to what we call the beautiful, or that render worthy the conduct we pronounce moral, are to be accounted the true purposes of education.

In Ch. XI the author discusses anew the antithesis which he pointed out some years ago between the analytical methods of psychology and the synthetical nature of the teacher's natural sympathy toward the child. The antithesis, he declares, has not been overcome, but psychology has now at least a few facts which can be helpfully applied by the teacher in his daily work. In the Preface, we are warned that the author has not changed his mind on this point: it is the science of psychology that has changed. One may easily grant that the science has been enriched during the last ten years, and that our author thinks that his disposition, insight and point of view have remained just where they were, and yet maintain with some show of reason that the so-called antithesis is more imaginary than real, since other professions have no

difficulty in preserving their humanity while applying their science, and one may be even haunted by the suspicion, while reading the discourse on educational psychology, that our author might, so far as the actual science itself is concerned, have said the same things ten years ago. However, as the novelists say: "this is a detail." We are none the less grateful that the book has at last arrived.

It is impossible in a review so brief as this must be to comment upon the many excellent things presented in the chapters on Mind and Body and The Biological Aspect, but what the reader has a right to expect is some notion as to what our author thinks psychology now has to offer to the teacher. It will, perhaps, suffice to select a single chapter, that on Attention, as a sample of the whole. In briefest outline the contents of the chapter are as follows:

The aim of attention is always the same, a fuller and richer insight into the material in hand. All bodily movements and states contribute to this end, and the process is the same, whether we attend to outer objects or to inner states. Attention neither approves or disapproves: it seeks to find out.

There are two sides to attention, not only tension to get an effect, but a suppression of all impressions not at the focus of attention. The nervous system is arranged to inhibit contrary solicitations. The channels of motor discharge leading into them are blocked: otherwise attention would be impossible. Ideas become vivid that find an open way, but ideas are suppressed whose way is blocked. This explains attention.

Internally there is a five-fold happening: (1) that becomes vivid to which we attend; (2) that to which we attend becomes clearer (vividness, which belongs to a unit, is to be distinguished from clearness, which is a grasping of the various parts of a manifold); (3) the object of attention develops under attention, becomes the center of associations, assumes new fringes of meaning, etc.; (4) all that leads away from the object of attention is suppressed, inhibited, and (5) we feel ourselves to be in an adjusted activity.

But growth in attention has narrow limits, for fatigue soon sets in, and thus serves as an automatic correction to excess. This fatigue gives scope at once to opposite and suppressed reactions. Attention wanders, rivalry appears and new ideas become vivid. This explains alternation in attention.

When an impression opens the channels through its own power, we

speak of involuntary attention, but this has small educational value. The great demand is for active attention.

The teacher must ask what factors make for vividness, clearness, and self-development in ideas, what to suppression and inhibition; what secures prolonged attention, what limits it. He must also discover the individual differences among his pupils, and how to treat them; how the child's attention differs from that of the adult; how it must be trained; how it changes with training, etc.

There follow many excellent suggestions for the guidance of the teacher in utilizing the foregoing distinctions. Thus, for example, it is pointed out that, though the sudden stirring up of attention is easy, attention so secured is of trifling value; that forced attention to uninteresting material may be equally undesirable; that to secure prolonged attention there must be a certain richness and variety in the external object, reënforced by richness of internal experience and knowledge; that the teacher should merely aid the pupil to find significant associative connections, not supply them ready-made, to the end that the pupil may acquire the power to attend; that motor responses and attitudes which favor attention are in a measure open to training; that children exhibit marked individual differences in attentive capacity; that all children must be trained in voluntary attention, etc.

Not all chapters are so fully treated as this: that on Will and Habit, for example, seems almost painfully meager. But perhaps it is because so much has been said elsewhere on this topic that our author passes over it so lightly. So far as will is concerned, it is reduced to ideo-motor action, while still less is said about habit.

The third part of the volume, which is devoted to the work of the schools, its instruction, studies, organization, etc., is full of happy and discerning suggestions, yet it is the least important and perhaps the least needed part of the discussion. The limits of the present review forbid any attempt to exhibit its contents.

Of the whole book it may safely be said, it will receive a warm welcome, and owing to the writer's widespread reputation and his manifold writings in the allied fields of medicine and law it will have a wide use. It is a good day for education when our ablest psychologists think it worth while to point out the value of psychology in the instruction and training of the young.

CHARLES DEGARMO.

Cornell University.

EDWIN A. KIRKPATRICK. *Genetic Psychology,* (New York: The Macmillan Company, 1909. Pp. 370.)

This new book by Professor Kirkpatrick is a valuable contribution to the study of the evolution of mind. It should prove of special value to teachers of psychology in normal schools, and colleges, to serious students of the psychological basis of education, and in general to those students who are interested in the development of mind from the lowest to the highest forms of its manifestation.

Like the author's *Fundamentals of Child Study,* this volume is much more readable than most books in its field. It abounds in concrete illustrations and so gives the ordinary reader sufficient basis for the generalizations drawn. It will prove valuable too, for many, in summing up in accurate and trustworthy fashion, much of the best that has been published on the subject of the evolution of mind as considered from the author's point of view.

The author's general point of view, which is to be set forth in greater detail in an early number of this journal, is one that will especially appeal to those practical persons who have the applications of psychology more or less definitely in mind. In fact the author's stated purpose is, at least in part, the tentative formulation of the facts and principles of genetic psychology for the use of educators. The references given at the end of each chapter are carefully selected, and should greatly aid in guiding the student who desires to extend his knowledge in this field. One of the commendable features of the book is the vital correlation between the physiological and the psychological. Where physiological basis of mental function is given, the author succeeds in making the functioning clear and illustrative.

After he has indicated the general point of view of genetic psychology, and emphasized the fact that the development of mind must be revealed largely through a comparison of the higher animals with the lower on the assumption of a continuous development, Professor Kirkpatrick states that genetic psychology is interested mainly "in comparing and grading the intelligence of animals only as a means of knowing what changes have taken place in the evolution of mind in the race, the order of such evolution, and the relation to each other of different types of activity." To determine these changes one must depend upon an analysis of (1) structure, (2) behavior. On the basis of these two, one can draw inferences regarding conscious states, but here there is need of constant care lest one assume behavior to be conscious when such

assumption is quite unwarranted. He then discusses in a general way the characteristics of organisms, and the evolution of behavior and of mind. A chapter is given to the structural basis of behavior, and numerous facts are cited illustrating the specialization of sensory-motor organs in the lower forms of animal life.

Three chapters on behavior follow. Types of Animal Behavior are illustrated by the characteristic reactions and activities of the amoeba, paramecium, hydra, starfish, mollusca, crustacea, fishes, frogs, tortoises, ants, guinea pigs, white rats, raccoons, monkeys, etc. Instinctive behavior is then summed up in one chapter, and a third chapter is devoted to Behavior of Individuals as represented in the acquisition of habits and ideas.

The writer then turns to a consideration of the *structure concerned in these more complex forms of behavior and in ideation.* By comparison of the nervous system of man with that of lower animals the parts especially characteristic of man have their functions indicated. In general the nervous system of man may be considered as like that of the higher mammals, but with considerable portions specialized for the performance of more complex functions. For example centers slightly, if at all, represented in the brains of lower animals are (1) those concerned in forming images of things; (2) those concerned in the production of word or symbol images; (3) those concerned in the formation of concepts and in the processes of abstract thought.

The author then treats of the physiological basis of perception, imagery, conception, attention and thought. Having thus described behavior and mental processes in objective terms, Professor Kirkpatrick turns his attention to conscious states. He sums up the tests and objective indications of consciousness and intelligence under (1) structure, (2) behavior, and then, starting with the facts obtained by introspection, attempts to infer from our own mental states, what the mental states of less highly developed minds may be.

The next chapter is devoted to *specific conscious states*, for example, the character of feeling in animals, pain, sensations, perceptions, images and memories, concepts and reasoning, and volitional activity. This clears the way for the consideration of *types of adaptive activity or intelligence.* Intelligence is conceived in a broader sense than usual, namely, as including all adaptation of means to ends, both conscious and unconscious. This broader conception seems desirable "in order that psychology, physiology and biology may have a common ground for the consideration of behavior."

It is, to be sure, somewhat startling to hear the author speak of "physiological intelligence," and to hear him discuss it as belonging in the same series with sensory-motor intelligence, representative intelligence and conceptual intelligence. We are assured that when we view intelligence in an entirely objective way, as the adaptation of means to ends, we find good reason for looking upon physiological processes as highly intelligent. For instance, "As a builder, physiological intelligence is not surpassed by the greatest mechanic or architect . . . Discriminative and selective activity, which chooses from the various substances introduced into the body, just the right elements for the building of each organ, is certainly comparable in accuracy to the perceptive judgment of the human builder." Again, "No heat-regulating device as yet invented by man will keep a building at a temperature so nearly uniform, amid rapidly changing external conditions, as is the temperature of the body, maintained by physiological intelligence." All this seems like an unjustifiable stretching of the word intelligence beyond its proper and recognized meaning.

Then follows a valuable chapter on the four Types of Learning Activity corresponding to the four types of adaptive activity indicated above. The importance of the early formation of good physiological habits is suggested by a variety of facts. For example the greater effectiveness with which the brain works at different parts of the day is doubtless due, at least in part, to the circulatory habits that have been established. Sobriety, cheerfulness, mental quickness, etc., have a similar physiological basis. The chapter also contains some valuable suggestions for educators as to the *nature* of the value of manual training, and the significance of the gap between theory and practice, as illustrated by the floundering of the college student for the first year or two after leaving college. There are also implications as to the teaching of elementary reading and number.

The final chapter sums up racial and individual development from the biological and the social points of view, and emphasizes the fact that the present human environment is much more psychic and social than merely physical, and that conscious selection now largely replaces natural selection.

B. R. Simpson.

Brooklyn Training School for Teachers.

WILLIAM H. ALLEN. *Civics and Health.* With an introduction by William T. Sedgwick. (Boston: Ginn and Company, 1909. Pp. xi, 403. $1.25.)

This book should be read by every superintendent and teacher, both because it is the most stimulating and forceful presentation of the need, the right and the duty of good health that has appeared, and because it pays special attention to the function of the teacher in the promotion of health for the individual and for the community. Although not intended for a text-book in school hygiene, it would form an excellent basis for discussion at gatherings of teachers, and it is an ideal book for home reading.

In Part I (Health Rights), good health is shown to be not only a source of personal happiness and profit, but also a civic obligation, and it is further shown that the physical welfare of school children affords the best and clearest "index" to the degree to which health rights are realized.

In Part II the way in which this "index" may be "read" in the classroom is discussed: here are treated mouth-breathing, contagious diseases, eye strain, ear troubles, dental sanitation, and allied school defects and infirmities, together with the health of the teacher himself and the health value of play and physical training.

Parts III and IV discuss the best methods of coöperating to meet health obligations and of organizing efficient machinery for guaranteeing health rights. Here Mr. Allen insists upon the enforcement of existing laws and the utilization of existing agencies. He believes that in America the school authorities should improve conditions by "getting things done" rather than by "doing things," as is the tendency in Europe. School eye and dental clinics, school surgery, free school lunches are not the best possible remedies, for "if parents, hospitals, dispensaries, and charitable societies will attend to children's needs, then relief at school is unnecessary, even though it may seem desirable" (p. 185), and "getting things done will leave the school free to concentrate its attention upon school problems" (p. 189).

Teachers will feel special interest in those of the concluding chapters that deal with "heredity truths and heredity bugaboos," instruction in sex hygiene, the element of truth in mental cures, and with the best methods of combatting the tobacco and alcohol evils. The author argues that the only proper course is to tell the exact truth about these evils, without exaggeration, and to teach "that the strongest reasons for

total abstinence are social and economic, and industrial, rather than individual and physiological."

This book is supplied with numerous attention-compelling illustrations, with a number of well-chosen statistical tables, and with several "questionaries" that the teacher may apply to the community, schoolhouse or classroom in which he lives and works. The text also abounds in pithy statements that challenge acceptance and stimulate interest. In illustration and in order to make clearer the scope and type of the work, I cite a number of those that have most impressed me. "Many a rural school violates with impunity more laws of health than city factories are now permitted to transgress" (p. 142). "School teachers are frequently 'sweated' as mercilessly as factory operatives" (p. 152). "To remove physical defects, causal conditions among all income classes should be treated, and not merely symptoms revealed at school by children of the so-called poor" (p. 170). "The school should pronounce the child's fitness to leave school and to engage in work" (p. 198). "The cost of exterminating it [tuberculosis] will be but a drop in the bucket if schoolteachers do their part this next generation with the twenty million children whose day environment they control for three-fourths of the year, and whose habits they can determine" (p. 245). "Physiological age should influence school classification and school curriculum" (p. 289). "The deficiencies of infants are infinitesimal compared with the deficiencies of the world with which we surround them" (p. 342). "Class instruction in hygiene is practicable for all matters pertaining to normal sex health" (p. 388). "To stimulate a child's imagination by untruths about alcohol is as vicious as to stimulate his body with alcohol" (p. 357). "Unhygienic living and mind cure cannot go to together" (p. 394).

In negative criticism there is little to be said. The present writer would prefer a more systematic treatment. He has, also, found certain pages confusing, e. g., Chapter XVI, the import of which is not clear until the following chapter has been read. In Chapter XIII Mr. Allen appears to regard the ergograph as a trustworthy device for measuring the diurnal curve of efficiency in the schoolroom, although the validity of this method has been seriously questioned, if not altogether negatived, by the work of Ellis and Shipe and several other investigators.

G. M. W.

W. H. HECK, *Mental Discipline and Educational Values.* (New York: John Lane Company, 1909. Pp. vi, 147.)

Professor Heck, of the University of Virginia, has done a valuable service in condensing within the compass of this small volume the most important results of the recent studies of formal discipline. In a short introduction, he pleads for a more vital recognition in educational practice of the modifications of the doctrine that these studies have necessitated. This is followed by a brief historical survey, adequately illustrated by excerpts from the literature. A third chapter discusses systematically the non-experimental evidence against the validity of the doctrine in its older form. Following this, the experimental literature is succinctly summarized, while a fifth chapter takes us into the realm of cerebral physiology, and concludes with the assertion that the theories of cortical localization "are sufficient in themselves to disprove the doctrine of formal discipline." Chapter VI, however, goes on to prove that a transfer of training may be accomplished through the development of "general concepts of method," thus making possible a realization of the aim of the older disciplinarians, albeit by a method that has only recently been explicitly recognized. Chapter VII outlines the author's theory of "specific disciplines," and Chapters VIII and IX apply his conclusions to the elementary and secondary curriculums, respectively.

It is safe to say that this book will be warmly welcomed both by teachers of education and by practical schoolmen. In fact, the systematic analysis of the literature is sufficient in itself to justify the publication. Especially valuable, however, is the clear-cut account of the possibilities of transfer through general concepts of method. Although this solution of the problem is suggested by nearly all of the recent studies, it has not been so well developed as in the present volume, and whether one agrees with Heck that this is the only means of transfer, everyone must agree that it offers the most helpful suggestions for the educator.

The author's general recommendations for the realization of the disciplinary values are formulated in what he terms the "theory of specific disciplines." He would choose the materials of the curriculum largely upon the basis of their intrinsic values, and he gives little credence to the popular belief that some subjects are better adapted for disciplinary purposes than are others. General concepts of method are to be derived from specific methods, just as any general concept is to be

induced from the particulars upon which it must rest. "The common elements of a number of specific methods are abstracted and bound together in a general concept of method, a general rule or principle of how to do, how to act, in situations of a certain general type" (p. 94). The elementary school, he contends, need be little troubled by these general concepts of method, because the pupil in this stage of his education is not ready for "such conceptualizing." "Therefore the mastery of particular methods, of special forms, is the methodological aim of the elementary school, and this means, of course, particular methods of the most comparative value in relation to particular subject-matter of the most comparative value" (p. 136). In the high school, however, "studies have a general-method value in addition to the value of their specific subject-matter and method." The most wasteful weakness in high-school teaching, we are warned, lies in the failure to work out and apply general concepts of method. The discussion of the general concepts to be derived from high-school subject-matter is especially good.

There are some parts of the book, however, that are less satisfactorily treated. The neurological evidence against transfer, for example, is very far from convincing. Until neurologists themselves are better agreed as to the function of the cortical areas, and especially as to the relation of these areas to mental activity, the educator will probably do well to view with some distrust inferences that are drawn from hypothetical functions. Again, the contention of Ebert and Meumann that there is a factor in transfer over and above the bringing into clear consciousness of the method of procedure needs rather more detailed and critical consideration than Professor Heck accords it. The assumption that the elementary school is not important in building general concepts of method has not as yet a satisfactory basis in experimental tests. In the reviewer's opinion, there is a strong probability that the specific training of childhood may be made to issue in general attitudes or prejudices that fulfill the same function as the logically-developed concepts of method. Finally, Professor Heck minimizes the importance that other writers have given to the emotional element in the effective formation of concepts of method. But certainly he would not deny that the concepts of scientific method, for example, can be more readily transferred from the high-school laboratory to the situations of later life if the pupil has a strongly emotionalized *belief* that the scientific method is really "worth while." Merely recognizing from the point of view of intellect that the scientific method involves

unprejudiced observation and careful induction is one thing; *feeling* the worth of this method as the best known means of attaining truth is quite another.

W. C. B.

H. W. CHASE. *Some Aspects of the Attention Problem.* Pedagogical Seminary, September, 1909, **16**, 281–300.

L. R. GEISSLER. *The Measurement of Attention.* American Journal of Psychology, October, 1909, **20**, 473–529.

Chase prefaces his review of the theoretical and experimental study of attention by a few remarks upon the genetic and the structural points of view. He defines attention, with Titchener, as "the process by which, psychically, ideas become clear." In his review of measurements of attention he follows Pillsbury's distinction of three methods, and concludes that all these methods have so far been unsatisfactory. This, he says, "does not seem so strange as clearness is at best a slippery concept." He forgets, however, that most of the authors that he cites did not attempt to measure "the degree of clearness of an idea," but worked with some other characteristic of the attentive consciousness. Meumann's list of seven pairs of attention types he rightly reduces to three phases or moments of attention, viz., "differences in degree of concentration, in quickness of adaptation, and in duration of concentration." Among children, individual differences in these phases are less clearly marked; nevertheless, pedagogy must not neglect such differences, especially those among pupils of the same age and grade. The conditions and effects of attention, our author thinks, have been carefully studied, and uniform conclusions have been reached as to their nature. On the other hand, in spite of the large number of authors who have investigated the matter, a considerable uncertainty still exists with regard to the relations of attention to other mental functions. For instance, Binet and Consoni seem to find a correlation between quickness of adaptation and degree of intelligence, but Winteler's results are negative. Again, Griffing and Winteler agree on the concurrence of general intelligence and a wider attention-span. Binet and Simon's positive results were confirmed by DeCroly and Degand, whose tests of intelligence involved all three characteristics of attention. [The name of the latter author has been persistently deformed by Chase, and,

in general, his bibliography of 69 items shows many errors in titles and names, *e. g.* J. Whipple for G. M. Whipple, "*Anwendung der Schulkindern*" for "*Anwendung bei Schulkindern*," *testes* for *tests*, etc.] In all the other studies of general intelligence to which Chase refers, attention, in one or all three of the phases mentioned, has been found to play an important rôle, yet no uniform conclusions can be reached. Similarly, the possibility of training attention has not been demonstrated, nor, in his opinion, is there more than a limited possibility of such training.

A month after the appearance of Chase's article in which he deplored the fact that no satisfactory means of measuring the attention had been found, there appeared the present writer's article in which this very problem is attacked.

The writer first gives a critical and systematic study of previous views concerning the nature and number of degrees of attention, classifies the various means of inducing variations of attention, and discusses those experimental investigations in which the attempt had been made to measure degrees of attention. He next describes three methods of his own for measuring attention, and exhibits the results obtained thereby.

In the first method, he attempted to correlate precision of mental work in continuous adding with muscular rigidity or motor inhibition. Variations of attention were induced by such distractions as an electrically driven tuning fork, an electric bell, a metronome, or a flicker moving across the field of vision. The observer, with his right hand, exposed numbers, one after another, as fast as he could add them, announcing each individual sum aloud, while with his left hand he held a plethysmographic handle. After each experiment he estimated his degree of attention to the adding. The experimenter checked off the correctness of each individual sum and registered its time on a kymograph. The results gave a positive coefficient of correlation of .60 between: best, good, average, bad, or least attention as introspectively estimated, and quickest, quick, average, slow, and slowest rate of work as objectively calculated. The plethysmographic curves that registered muscular rigidity, proved, however, to be non-significant.

In the second method practically the same experimental conditions prevailed, but the observers now estimated their variations of attention in terms of degrees of clearness (in the first method no particular criterion had been prescribed). For this purpose they had constructed for themselves in especially designed preliminary series an ideated scale of nine clearness-degrees, ranging from maximally clear to absolutely

obscure. The addition tests were of uniform difficulty, and the previous distractors were used in all possible combinations in order to increase their effectiveness. Nevertheless these distractors could not reduce the observers' attention to his adding below the fourth or fifth degree of clearness.

In the third method, the observers marked little red circles appearing successively and at a quick rate in horizontally varying positions that were exposed step-fashion by McDougall's memory apparatus. In some of the experiments the circles appeared among eight letters, digits, or small colored discs, all arranged in horizontal rows. In others the marking had to be done while the observer spelled difficult phrases or recited lines of poetry. By thus varying the stimulus patterns with the circles, or complicating the task of marking, or by voluntarily directing the attention, now to the circles, now to the letters, digits, or colors, and now to spelling or reciting, all possible degrees of clearness of marking the circles were obtained. After each experiment the observers were asked to estimate both the degree of clearness of the various mental processes involved, and the degree of accuracy in marking.

The following are the main conclusions: (1) A very close parallelism was found to exist, in both the second and third methods, between introspectively distinguished variations of attention and corresponding differences in the precision of work performed at these levels. (2) The introspective estimation of the quality of work was not as reliable as the evaluation of the degrees of attention. (3) The degree of concentration does not depend so much upon the nature and number of distractions, as upon the nature and complexity of two simultaneous tasks and the preliminary instructions regulating adjustment and direction of attention. (4) There seem to be two types of the attentive consciousness, (*a*) the dual-division, in which a unitary group of mental processes occupies the focus of greatest clearness, while another, simultaneous group constitutes a vague or obscure background, and (*b*) the multi-level formation, in which processes occur whose clearness is intermediate between that of the focus and the background. (5) In the dual-division type of attention a reciprocal relation exists between focus and background, that is, the clearer the former, the obscurer the latter, and conversely.

L. R. Geissler.

Cornell University.

NOTES AND NEWS

Dr. Irving Elgar Miller, author of *The Psychology of Thinking*, and formerly of the Milwaukee State Normal School, has been appointed professor of psychology and director of research work in the Colorado State Normal School.

Lewis F. Anderson (Ph.D., Clark), for ten years instructor in psychology and education in the Marquette (Michigan) State Normal School, has been appointed assistant professor of education in the University of Illinois.

The semi-annual meeting of the Illinois Schoolmasters' Club, held in Peoria, October 8 and 9, was given over to a discussion of the doctrine of formal discipline. Prof. S. S. Colvin, of the University of Illinois, opened the discussion with a summary of the experimental and critical literature, foliowed by a constructive interpretation of the doctrine. President David Felmley, of Normal, and Professors Judd and Butler of Chicago were also among the speakers. Professor Colvin's paper has been issued as a bulletin by the School of Education, University of Illinois, and will be reviewed later in this JOURNAL.

The teachers of psychology in Iowa have organized a state association for the immediate purpose of conferences in regard to the teaching of the psychology which is required for the state teachers' certificates. The first meeting will be held at the State University during the Easter recess.

Capt. John L. Shepard, of the Medical Corps, U. S. A., Fort Logan, Colo., is investigating the feasibility of adding one or more mental tests to the usual physical and medical examination of men who apply for enlistment. It is hoped in this way to detect and to eliminate before enlistment those men whose mental ability is so deficient as to render them incapable of the proper discharge of their duties as soldiers. The present mental examination demands only ability to read and write and to tell right from left.

The University of Chicago has established, in connection with the

School of Education, a laboratory for the study of educational problems. The *School Review* says of this laboratory:

> The equipment . . . . will in some respects resemble the equipment of a psychological laboratory, but there will be special devices for investigating writing and reading and the other forms of mental activity which are developed in school work.

William Bishop Owen, for several years associate professor of education in the University of Chicago and dean of the University High School, has been appointed principal of the Chicago Normal School to succeed Mrs. Ella Flagg Young.

Mr. G. N. Gilbertson has been appointed instructor in psychology at the University of Colorado. He will take part of the work of Professor Henmon, who is acting dean.

Dr. C. Lloyd Morgan, F. R. S., well known for his works on animal behavior and his *Psychology for Teachers*, has resigned the office of vice-chancellor of the University of Bristol after a term of service of twenty-two years. On the occasion of the acceptance of his resignation the Council of the University placed on record its sense of the distinguished service rendered by him to the cause of university education during this period.

Dr. E. H. Henderson, professor of education and psychology at Adelphi College, Brooklyn, N. Y., has been transferred to the chair of philosophy in that institution.

At Clark University a Children's Institute has been established for the scientific study of the physical and mental nature of the child. Among the departments already organized are the library department under the head of Dr. Theodate L. Smith, the department of hygiene in charge of Dr. Wm. H. Burnham, the department of experimental pedagogy presided over by Dr. Mary Tanner, and the department of religious and moral education under the supervision of Dr. Arthur Conklin. President G. Stanley Hall is the Director of the Children's Institute.

Dr. Naomi Norsworthy, instructor in educational psychology at Teachers College, Columbia University, has been made adjunct professor of educational psychology in that institution.

We note with satisfaction the appointment of Dr. David S. Snedden, adjunct professor of educational administration in Teachers College, Columbia University, as Commissioner of Education for the State of Massachusetts. Dr. Snedden will have the supervision of all the state educational institutions, including the normal schools, and one of his first tasks will be the establishment of the new state system of industrial education.

Dr. E. C. Sanford, professor of psychology in Clark University, and one of the leading experimental psychologists in America, has been appointed President of Clark College.

Dr. E. B. Huey, professor of psychology in the University of Pittsburgh, who has been spending the past year in Paris in the clinical study of mental defectives, has been placed in charge of the newly established department of clinical psychology at the Lincoln State School and Colony, the state institution for the feeble-minded, Lincoln, Ill.

Dr. J. Mark Baldwin, formerly head of the department of philosophy in Johns Hopkins University, is spending the winter in Paris. Dr. Baldwin has been advising the Mexican Department of Education in the reorganization of the state system of education, and will assist at the opening of the Mexican National University in September, 1910. He states that the rumor of his appointment as president of that institution is incorrect.

According to *Science* Dr. G. C. Fracker has resigned the chair of philosophy and psychology at Coe College to accept the chair of psychology and education at the State Normal School of Marquette, Mich., where he succeeds Prof. L. F. Anderson, who has gone to the University of Illinois. Dr. F. S. Newell has been appointed to the position in Coe College.

PUBLICATIONS RECEIVED TO DECEMBER 1, 1909.

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